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BURGH OF MOTHERWELL AND WISHAW

ANNUAL REPORT

OF THE

SEWAGE WORKS MANAGER

FOR THE

Year ended December 31st, 1955

DONALD H. BARRACLOUGH,
F.I.P.H.E., M.Inst.S.P., M.R.S.H.

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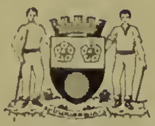

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STREETS AND DRAINAGE COMMITTEE
(1955-56)

Provost C. Donnelly
Police Judge T. Wilson (Convener)
Bailie D. Wilson (Vice-Convener)
Bailie F. McCluskey
Police Judge D. Cross
Councillor A. Howson
Councillor A. Crichton
Councillor P. Duffy
Councillor T. Train
Councillor J. Haig

SEWAGE WORKS DEPARTMENT,
CLYDE PARK SEWAGE WORKS,
MOTHERWELL.

January, 1956.

Mr. Chairman and Gentlemen,

I have the honour to present my Annual Report for the year ended December 31st, 1955.

The total rainfall recorded at the Clyde Park Sewage Works was 24.85 inches, compared with a figure of 42.04 inches for the previous year, and this low rainfall and a fine summer undoubtedly had a favourable influence on the operation of your sewage purification works. The volume of sewage reaching the various works was lower than in a wet season but the strength of the sewage correspondingly greater and the total pollution load dealt with was much higher. The total volume of sewage which has been given full treatment at the three sewage works is estimated to be 2,138.6 million gallons for the year or a daily average of 5,859,100 gallons. There is no provision for measuring the flows above three times dry weather flow so that the total volume reaching the purification works is not known. The Burgh is sewered on the combined system of sewerage and the sewage is treated at purification works situated at Carbarns, Clyde Park, and Coursington.

CARBARNS WORKS

Total volume of sewage treated	-	1,086,967,000 gallons
Average per day	-	2,975,000 "

The Carbarns Works serves the Wishaw and Craigneuk areas of the Burgh and is the largest of the three purification works. Opened in 1934, and designed for a dry weather flow of two million gallons per day, the treatment is by the diffused air activated sludge process, sludge being subjected to anaerobic digestion and the gas evolved used for power production.

This works is overloaded and careful measurement of the dry weather flow during the fine summer period showed that an average of 2.6 million gallons per day was being received, or an increase of 30% on the design flow. This overload is shown in the quality of the final effluent which at times is not up to satisfactory standard. To meet this overload which is steadily increasing because of housing development within the drainage area, a stage by stage scheme of extensions has been prepared, and work was commenced on two stages during the year. These were the provision of an additional sludge digestion tank, and additional sludge drying beds.

During the year the surplus activated sludge pipe line has been re-routed so as to discharge the surplus sludge into the raw sewage flow upstream of the primary clarifier instead of directly into the clarifier where it caused considerable turbulance and thus retarded settlement of the solids.

Digestion of the sludge was very satisfactory for most of the year and the quantity of gas produced exceeded that of the previous year by over two million cubic feet, or an average increase of 5,600 cubic feet per day, which enabled the quantity of fuel oil used for power purposes to be reduced by 3181 gallons compared with the previous year. Particularly in the second half of the year the running of the duel fuel engines was considerably improved, the total hours run by the engines showing an increase of 1010 on the previous year with a total of 8418 hours, and the quantity of electricity generated increased by 46,165 units to a total of 415,040 units. Drying of the sludge was improved by the favourable weather during the summer but it was necessary to dispose of a considerable quantity of sludge by dumping into the lagoons.

Production of foam due to the presence of synthetic detergents in the sewage has previously been negligible at this works, but during the year under review there has been an increase in the quantity produced on the aeration tanks, and at times it has been excessive.

CLYDE PARK WORKS

Total volume of sewage treated - 745,725,000 gallons
Average per day - 2,043,000 "

The Clyde Park Works serves the area of Motherwell which drains to the River Clyde, and was completed in 1949. The works was designed to treat a daily dry weather flow of 1.5 million gallons by the diffused air activated sludge process, with sludge treatment by heated digestion and open drying beds.

Except for a few days when acid trade wastes caused a breakdown in purification, the effluents from the Clyde Park Works have been of very good quality. The foam produced on the aeration tanks because of the synthetic detergents present in the sewage has continued to give trouble and more effective use of sprays will be necessary if nuisance is to be avoided.

Sludge digestion has been satisfactory there being an increase in the average daily gas production of 1986 cubic feet which can probably be attributed to the dry season and favourable conditions. Towards the end of the year some raw sludge was transferred from the Coursington Works as a trial and should this practice prove satisfactory the additional load will fall on the digestor and drying beds at Clyde Park Works. Drying of the digested sludge has been good, especially during the summer.

Some trouble has been experienced due to discharges of acid trade effluents to the sewers and a considerable amount of time has been spent in tracing these. It is expected that as a result of this work the trouble will be eliminated at the source.

COURSINGTON WORKS

Estimated total flow treated - 30,587,000 gallons
Estimated average per day - 838,000 "

Because of the construction of a new sewer connecting to these works, actual flow figures are not available as the recorder was out of commission for a considerable time.

The Coursington Works is the oldest and smallest of the Town Council's Sewage Works, and serves the area of Motherwell which drains to the South Calder Water. The effluents from this works have been consistently unsatisfactory mainly because of the presence in the raw sewage of a high percentage of crude gas liquor. However, the filter plant has continued to effect a considerable reduction of the pollution load but it is impossible to produce satisfactory effluents.

The practice of treating the filters with gammahexane for the control of filter flies, particularly anisopus fenestralis, has been continued throughout the summer, and at no time were the flies so numerous as to create a nuisance.

Sludge disposal facilities at this works are very primitive, and during the hot weather complaints about the odour nuisance were received from residents in adjacent property. The question of sludge disposal has been cause for concern for some time and trials have been made with a view to transferring the crude sludge to Clyde Park Works by tanker wagon. The difficulties which were encountered have been overcome step by step, and it now appears that this method can be used to alleviate the odour nuisance and sludge disposal problem at Coursington Works. The sludge transferred is being passed to the digestion plant at Clyde Park Works and thus an additional load is being placed on that plant.

In December the new Todholeburn sewer was connected to the works and sewage passed through. This will bring a larger total flow of sewage to the works in the future.

EXPERIMENTAL WORK

Experimental work in connection with the problems affecting the operation of the Town Council's Sewage Purification Works has been carried out progressively during the year, no fewer than seventeen separate trials being made and the results recorded. Eight of these trials were connected with the acceleration of sludge drying, and although progress was made there still remains much to be done on this difficult problem.

Tests were also made on the use of porous concrete in sludge bed construction, and this method is being used in the new drying beds at Carbarns Works.

Control of foam on the aeration tanks was also a problem which was given attention and trials were made to develop a method of spraying to keep down the foam which is produced because of the presence in the sewage of synthetic detergents. The spraying of the returned activated sludge was tried and whilst the foam could be kept in check there was deterioration in the quality of the final effluent. When this method proved unsuitable the development of a method of spraying final effluent was concentrated upon, many types of sprays being made and tested, and finally one was made which proved very effective at the relatively low pressure of five pounds per square inch.

Preliminary studies were made on the effect of aluminium chlorohydrate on sludge digestion and gas evolution, and this subject is likely to be one for further investigation in the future.

LABORATORY

Work done in the laboratory continues to increase. A total of 1473 samples were received during the year, and the analysis of these samples involved the making of 4954 separate estimations and recording the results thereof. In addition 123 sludge samples were examined which involved 582 estimations, whilst many minor 'spot' tests were carried out for plant control. The work described under the section of this report dealing with experimental work also involved the Laboratory Staff in making a large number of readings such as temperature, humidity and barometric pressure.

TRADE EFFLUENTS

Surveillance of the trade effluents discharged to the Town Council's sewers was continued and a total of 190 visits made to trade premises. The total number of samples taken was 348, an increase of 45 on the previous year, and of these 18 were found on analysis to be unsatisfactory, mainly because of the presence of mineral acid, although in some cases there was also an excess of chromium present.

In connection with acidic discharges much time has been spent in sampling on sewers and tracing the source of spasmodic discharges, but this was eventually located and the firm concerned have been requested to take steps to neutralise discharges from their premises.

STAFF

There were no changes in the establishment during the year nor in the personnel on the technical staff of the Department. The maintenance engineer at Carbarns, Mr. G. Preston, was appointed Sewage Works Manager to the Hale Urban District Council, Cheshire, and he was succeeded at Carbarns by Mr. C. Naules, of Bellshill.

GENERAL

The Sewage Works of the Burgh, particularly the Clyde Park Works, continue to be of interest to many who are engaged in this branch of Public Health Work, and in addition to visitors from many parts of Britain there were visitors from Australia, New Zealand, Sweden and Egypt.

A development of great importance to all local sewerage authorities which took place during the year was the formation of The Clyde River Purification Board under the provisions of the Rivers (Prevention of Pollution) (Scotland) Act, 1951. The new Board will be responsible for the prevention of river pollution in the Clyde watershed, and in due course the effluents discharged from the Burgh Sewage Works will be subject to inspection by the River Board's Officers.

In conclusion I wish to record my appreciation of the support given by the Convener and Members of the Streets and Drainage Committee, and by the Staff of the Sewage Works Department during the year.

TABLE 1

Total volume of sewage given full treatment

Month	Carbarns Works	Clyde Park Works	Coursington Works
1955		(Millions of Gallons)	
January	110.979	74.440	30.650
February	97.299	58.930	26.108
March	111.968	73.900	31.171
April	87.549	56.685	25.114
May	94.950	67.390	28.918
June	79.445	54.135	24.714
July	77.843	57.695	26.496
August	79.234	52.175	-
September	81.972	57.465	22.390
October	88.940	56.185	22.285
November	83.404	55.705	-
December	93.384	81.020	-
Total	1,086.967	745.725	Estd. 305.870
Daily average	2.975	2.043	0.838

Note.- Stormwater flows are not measured.

Full flow figures not available for Coursington Works because of sewer construction work in progress.

TABLE 2

Average daily volume of sewage given full treatment

Month 1955	Carbarns Works	Clyde Park Works (Gallons per day)		Coursington Works
January	3,580,000	2,465,000		989,000
February	3,475,000	2,105,000		932,000
March	3,612,000	2,319,000		1,005,000
April	2,918,000	1,889,000		837,000
May	3,065,000	2,174,000		933,000
June	2,648,000	1,804,000		824,000
July	2,511,000	1,861,000		855,000
August	2,556,000	1,683,000		-
September	2,732,000	1,915,000		746,000
October	2,869,000	1,812,000		719,000
November	2,780,000	1,850,000		-
December	3,012,000	2,613,000		-
Average for year	2,975,000	2,043,000	Estd.	838,000

Note.- Figures given to the nearest 1,000 gallons.

TABLE 3

Gas produced from sewage sludge during digestion

Month 1955	Carbarns Works Total cu/ft.	Carbarns Works Daily Average cu/ft.	Clyde Park Works Total cu/ft.	Clyde Park Works Daily Average cu/ft.
January	684,301	22,074	584,585	18,857
February	565,069	20,181	590,180	21,078
March	630,934	20,352	595,248	19,459
April	702,034	23,401	656,022	21,867
May	891,278	28,751	629,451	20,305
June	831,542	27,700	663,438	22,114
July	613,535	19,791	558,893	18,029
August	815,629	26,310	610,547	19,694
September	730,073	24,333	533,536	17,784
October	846,442	27,304	597,367	19,269
November	727,991	24,266	548,700	18,290
December	516,654	16,666	616,066	19,873
Total	8,555,482		7,183,732	
Average for year		23,450		19,681

Note.- Gas used for heating the digestor at Clyde Park Works was 3,599,683 cubic feet, an average of 9,862 cubic feet per day.

MISCELLANEOUS DATA

Area of the Burgh	6330.14 acres
Estimated population	69,500
Approximate yield of 1d/£1 rate	£2,471

Clyde Park Works

Meteorological 1955	Rainfall (ins)	Temperature F. Max.	Min.
January	2.25	53	9
February	2.27	46	12
March	1.48	54	20
April	0.69	68	30
May	2.76	86	32
June	1.05	79	36
July	1.30	88	42
August	1.24	88	40
September	3.03	76	36
October	2.34	69	26
November	1.64	58	22
December	4.80	56	14
	24.85	88	9

Design dry weather flow	1,500,000	gallons/day
Present dry weather flow	1,565,000	" "
Detritor operating	2,613	hours
Grit removed by detritor	60	cu. yds.
Total flow treated	745,725,000	gallons
Activated sludge returned to plant	393,440,000	gallons
as per cent of total flow treated	52.75%	
Surplus activated sludge	32,452,000	gallons
as per cent of total flow treated	4.35%	
Activated sludge in mixed liquor (1 hour) average	12.9%	

Carbarns Works

Design dry weather flow		2,000,000	gallons/day
Present dry weather flow		2,600,000	" "
Detritor operating		2,051	hours
Grit removed by detritor		44	cu. yds.
Screenings removed		25	cu. yds.
Current generated	No. 1 engine	212,540	kWH.
	No. 2 engine	202,500	kWH.
Current purchased		36,673	kWH.
Total current consumed		451,713	kWH.
Current consumed per million gallons treated		416	kWH.

STAFF

Chief Charge Engineer – T. Scott

Assistant Chemist – W. Templeton, A.M.Inst.S.P.

Apprentice Chemist – E.R. Napier

Carbarns Works

Maintenance Engineer/Foreman – G. Preston (Resigned 5/4/55)

– C. Naules

Shift Engineers – T. Brown
– R. Gartshore
– H. Paterson
– R. Preston

Outdoor Staff – P. Cullen
– P. Kearney
– G. Gilchrist

Clyde Park Works

Maintenance Engineer/Foreman – J.F. Taylor

Outdoor Staff – W. Black
– R. Douglas
– M. Ramsey
– J. Smith
– A. Whysker
– J. Young
– J. Bracken (Driver)

Coursington Works

Attendant – J. Felvus